

quickly to reduce damage and stress to the organisms, and will be wrapped in foil, placed in plastic bags, and labeled for analysis.

Because the levels of dioxin in the environment are so small, especially sensitive techniques have been developed for measuring it. The most common combines careful sample preparation with the use of gas chromatography and mass spectrometry. However, this technique is expensive; a single test of each sample costs about \$1500. EPA is working to develop analytical methods which are more sensitive, more rapid, and less costly.

How Long?

The actual sampling takes very little time, but laboratory analysis may take as long as two to four months. EPA will notify property owners of the sampling results as soon as possible.

In the Meantime..

EPA and other federal agencies have research underway to learn more about the extent of dioxin contamination and the risks of exposure. Because the movement and effects of dioxin in the environment are not fully understood at this point, EPA is acting conservatively on the basis of current data.

The Agency is evaluating methods of disposing of or destroying contaminated soils and wastes. Established technologies include incineration, chemical degradation, and biological treatment measures, but EPA is working to find other methods of disposal as well. One promising technique is to treat soil with a chemical compound and sunlight. This method holds promise for actually detoxifying the dioxin molecule. Some temporary methods to limit exposure include: excavating highly contaminated soil and removing it to a safe location; securing and capping the contaminated area; and using high efficiency vacuums and liquid dust suppressants.

Because dioxin and other hazardous wastes generate intense public interest and concern, each of EPA's 10 regional offices has a dioxin information coordinator to answer your questions or provide the latest and most accurate information about dioxin studies in your community.

Regional Community Involvement Contacts for Dioxin

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Learning More About Dioxin

In the past few years, you may have heard a lot about a substance called dioxin. Neither dioxin nor its associated problems are new. Questions about its effects have been raised since it first was synthesized in 1872, and many of those questions still need answers. Now new questions have been raised about dioxin, both as an environmental contaminant and a potential public health problem.

The fact is that we still don't fully understand dioxin or how exposure to dioxin affects human health. We don't fully know how much dioxin is in the environment, or where it is. We aren't even sure how best to clean it up when we do find it. The only sure thing is that dioxin contamination has become an extremely complex and emotional issue.

Because of concerns about dioxin, the United States Environmental Protection Agency (EPA) initiated a "national dioxin strategy" and will:

- study the nature of dioxin contamination throughout the U.S. and the risks to people and the environment;
- clean up dioxin-contaminated sites that threaten public health;
- find ways to prevent future contamination; and
- find ways to destroy or dispose of existing dioxin.

As a first step, EPA will sample over 1,000 sites all over the country. These range from sites where certain pesticides were produced and EPA most expects to find dioxin, to places where EPA least expects to find dioxin. The places where EPA least expects to find dioxin include private property and citizens are being asked to cooperate in the study by allowing field teams to



take small samples of soil from their property. This sampling is extremely important as it will help EPA to learn if there are "background" levels of dioxin in the environment.

EPA has prepared this leaflet to explain this study more fully.

What is Dioxin?

The word dioxin is actually a generic term for a group of compounds known as polychlorinated dibenzo-p-dioxins (PCDDs), but in popular use it usually refers to the most toxic and carefully studied of these compounds — 2,3,7,8 tetrachlorodibenzo-p-dioxin, or 2,3,7,8-TCDD, or simply TCDD. **Whenever we discuss Dioxin in this leaflet, we are referring to 2,3,7,8-TCDD.**

Nobody produces dioxin on purpose. It is an unwanted but almost unavoidable by-product that comes from manufacturing several commercial substances, chiefly the pesticide 2,4,5 trichlorophenol. This pesticide is then used as a basic ingredient in the manufacture of several other pesticides. (Pesticide is a general term for chemical products used to destroy or control unwanted insects, plants, fungi, mites, rodents, bacteria, or other organisms).

Where Does It Come From?

TCDD enters the environment in several ways. For example, through dioxin-contaminated chemical products; as a component of the wastes that are produced in manufacturing these products; and through the widespread use of these contaminated products. Certain types of combustion are other possible sources of dioxin contamination.

At What Level is Dioxin a Concern?

In general, it is the potential for exposure, either through ingestion or contact with contaminated soil or through eating contaminated fish, that presents the greatest possibilities for health risks. The Centers for Disease Control (CDC) considers 1 part per billion (ppb) of dioxin in soil to be a level of concern in residential areas.

The Food and Drug Administration (FDA) recommends limiting consumption of fish with 25 parts per trillion (ppt) or greater of dioxin and not eating any fish with greater than 50 ppt of dioxin. EPA, in conjunction with these other

federal agencies and State and local health agencies, will alert you to any precautions you should take whenever dioxin is detected at levels that may adversely affect your health. These agencies will also decide what further actions are necessary.

Why is EPA Concerned about 2,3,7,8-TCDD?

Although scientists disagree on the long-term health effects of exposure to dioxin, tests on laboratory animals indicate that it is one of the most toxic man-made chemicals known. Because information on effects to humans has come mostly from accidental exposures, the data are not definitive. Scientists do agree, however, that exposure to TCDD can cause a persistent skin rash called chloracne, as experienced by some workers exposed to TCDD in the work place or through industrial accidents. Tests on laboratory animals also indicate that exposure may result in a rare form of cancer called soft tissue sarcoma, liver dysfunction, elevated blood cholesterol, nervousness, and other problems.

How is EPA Studying TCDD?

In its study of dioxin, EPA will look at seven categories, or "tiers" of sites, ranging from those where no contamination is expected (Tier 7) to those sites most likely to be contaminated (Tiers 1 and 2).

Tier 7 includes background sites where EPA does not expect to find dioxin. The purpose of sampling these sites is to determine whether dioxin contamination is widespread and, if so, at what levels.

Tier 7 sampling consists of two phases. The first involves sampling soils from 300 urban and 200 rural locations across the country. Most of this sampling will take place on private property. No one whose property is selected is required to permit the sampling. Cooperation is encouraged but is strictly voluntary.

The second phase involves sampling fish or shellfish taken from 420 locations, including streams throughout the U.S., waters of the Great Lakes, and estuarine and coastal waters. The sampling for this tier is a focus of EPA concern because dioxin in soil and in fish presents the greatest potential exposure to humans.

Tiers 1 and 2 include facilities where pesticide products containing dioxin were manufactured or

sites used to dispose of production wastes. EPA estimates that 80 percent of all dioxin contamination will be found in these two tiers. Sampling at these sites has already begun under EPA's Superfund program.

Tier 3 includes facilities where pesticides that may be contaminated with dioxin were formulated and sites where these facilities disposed of their wastes.

Tier 4 includes sources that may be emitting dioxin during the combustion process.

Tier 5 includes sites where pesticides that may be contaminated with dioxin have been used or are being used. These include rice and sugar cane fields, rangelands, orchards, forest lands, rights of way, and possibly some wood products processing plants.

Tier 6 includes facilities where improper quality controls during the production of certain chemicals and pesticides could have led to dioxin by-products.

How Were Background Sites Chosen?

All 500 soil sampling sites in Tier 7 were randomly chosen by statistical methods from over 13,000 locations across the country. One hundred fish sampling sites, taken from the U.S. Geological Survey's National Stream Quality Accounting Network (NASQAN), also were randomly selected.

An additional 320 fish sampling sites were purposely chosen from locations of regional or national interest. These sites are of interest because they are near population centers or are in commercial or recreational fishing areas. Their selection does not mean that they are suspected of being contaminated by dioxin.

How are Samples Taken?

Soil sampling is done very simply. From the middle of each site, field crews will take samples with a tulip bulb planter from a depth of about three inches. The sample is placed in a square mason jar, labeled, and sent to an EPA laboratory for analysis.

Fish sampling is more complicated. At freshwater sites, crews will take samples both of bottom-feeding fish and game fish; at coastal and estuarine sites, only mussels and oysters will be taken in most cases. Samples will be taken very